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ABSTRACT

A one-parameter latent trait model was the basis of the test development procedures in the Basic Skills Assessment Program (BSAP) of the Department of Defense Dependents Schools (DoDDS). Several issues are involved in applying the Rasch model to an assessment program in a large school district. Separate sets of skills continua are arranged by difficulty and interrelatedness. An information curve provides an estimate of the error of measurement at each ability level, and the Quality of Measure Index (QMI) is used in the item revision process to estimate curricular relevance and objective-item congruence. Low use of the BSAP results can be attributed to inadequate inservice information, delayed delivery of test results, reporting errors, and difficulties with relating a student to the calibrated curriculum through continua sets. Concepts reflected in the study recommendations include improved training, timeliness, simplicity, and trust. (CM)

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AN APPLICATION OF LATENT TRAIT TEST METHODOLOGY TO A LARGE SCHOOL DISTRICT TESTING PROGRAM

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TM 820 630

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I. INTRODUCTION

The Department of Defense Dependents Schools (DoDDS) has administered an innovative Basic Skills Assessment Program (BSAP) using latent trait methodology for the past three years. This paper will focus on the test development procedures using the Rasch model, the five reporting formats developed to accommodate this unique testing program, the use of test results in the six regions of the Overseas Dependents Schools, and the issues involved in applying the latent trait methodology to a basic skills assessment program in a large school district.

II. DESCRIPTION OF THE BASIC SKILLS ASSESSMENT PROGRAM

A. Purposes

The basic skills tests in reading, language arts, and mathematics for selected elementary and secondary school grades were designed by the Los Angeles Test Development Center to reflect the dependents schools' major program objectives in each of those basic skill areas. The major purposes of the tests were for diagnosing deficiencies in basic skills, for planning appropriate instructional interventions, and for formative evaluations of instructional programs.

Since one focus of the basic skills program was to be the measurement of individual students, a one-parameter latent trait model was adopted. The Rasch model, which avoids many of the problems in describing individual performance inherent in classical test theory, is based on the assumption that student performance can be best estimated by measuring responses to a set of items of known difficulty. It provides a method for estimating item difficulty that does not depend upon the characteristics of the particular group being tested.

B. Test Development

The basic skills tests were constructed from the item bank at the Test Development Center of the Division of Educational Measurement, Evaluation and Research of the Los Angeles County Superintendent of Schools' office. Across all forms within the three content areas, approximately 50,000 students were administered calibrated forms in the fall of 1978.

At the time of the item pool collection, work was begun on the development of an item classification system for each of the defined content areas. The system was developed to provide both a method of determining the extent of curricular coverage of the proposed item banks and a procedure for assessing items with respect to a specific skill within a bank.

The BSAP tests constructed using the item bank and item classification system, were administered over a 3-year period to 35,000 students in grades 7, 9, and 11 in the spring of 1979; 65,000 students in grades 3, 4, 5, 6, 7, 9, and 11 in the spring of 1980; and 48,800 students in grades 4, 6, 7, 8, 9, and 11 in the fall of 1981. Table 1 furnishes descriptive information concerning the

Fall 1981 tests. Characteristics of the tests described in the following paragraphs refer to the Fall 1981 tests.

C. Test Characteristics

1. Reliability

Since the tests were developed to make decisions about individuals, the traditional reliability statistics are not appropriate. The analog of reliability and the standard error of measurement for tests developed according to the Rasch model is the test information curve (Hambleton, 1980). The reliability of interest is accuracy of estimates at each individual's ability level for a particular test. This precision of measurement function is an information curve that provides an estimate of the error of measurement at each ability level. Information curves for each of the Basic Skills Assessment Tests appear in the 1982 technical report (Sample in Figure 1.). Each figure indicates the ability range for which the test provides its best information about examinees. The precision of measurement differs by test and among ability levels within tests. However, it was found that all tests are most accurate for students in the middle ability levels and score ranges. The curves indicate that for students who did extremely well or extremely poorly on the tests, other sources of information are needed to assess accurately their achievement levels.

2. Validity

The item revision process used provided validation of test content in terms of curricular relevance and objective-item congruence.

A second measure of test validity is whether the test is functioning as intended. For tests developed by the Rasch model, a test measures what it says it does when the items elicit student responses congruent with predictions of the model (LA-TDC, 1982). Rasch model predictors are based on the extent to which observed student responses are consistent with expected performance for students at a given ability level. The Quality of Measure Index (QMI) is the statistic that indicates the extent to which items that a student was supposed to answer correctly were actually answered correctly. High QMI indices mean that expected and observed test scores for students in given ability ranges are close; low QMI indices mean that differences between expected and observed performance either were large for some students or that there were many discrepancies in expected and observed scores for the group. Table 2 shows that each test was found to have a QMI above 90, which indicates acceptable functional validity.

III. REPORTING FORMATS

One of the major purposes of the DoDDS BSAP is to provide empirical data to assist local educators in curriculum development and improvement. The following reporting formats available to administrators, teachers, specialists, and parents are described with reference to their potential utility.

A. Parent Report Form

This form was designed for the Fall 1981 testing to facilitate understanding an individual student's test results. Results are presented in terms of skill area strengths, skill areas which may need additional instruction, and skill areas not yet mastered (Figure 2).

Scores given are the student's Measure on Scale, Grade Level Range, and Percentile Equivalent. The Measure on Scale identifies the student's position on an equal-interval scale of skills within a content area. It represents the student's underlying ability in that achievement area, and its theoretical range is 50-800. The Grade Level Range is the range of Measures on Scale found in DoDDS group for that grade level. The Percentile Equivalent represents the student's relationship to a national norm group tested in Spring 1981. The Parent Report Form is meant to represent in simplified form the information contained in the Student Report Form.

B. Student Report Form

The Student Report Form contains information similar to that on the Parent Report Form, but it is more detailed and potentially more useful for individual student diagnosis and instructional planning (Figure 3). It indicates in the four quadrants which items the student was expected to get correct and incorrect based on ability, and which items the student was not expected to get correct and incorrect. In addition to the student's Measure on Scale, the Probable Range is given, which is the range of scores in which one would expect the student's Measure on Scale to fall, given repeated testing within the same instructional context. Indicated also is the Measurement Quality, which represents the extent to which the student responds in an expected pattern of getting easy items correct and more difficult items wrong. If it is low (i.e. below 90), it is a warning to examine the student more carefully. Measurement Quality is an indication of the reliability of the student measure. It indicates the interaction between the student's ability and the difficulties of the items. Variables which can affect it include guessing, cheating, random answers, and instructional gaps.

The achievement scale runs down the center of the report, providing the range of item difficulties. The student's measure is made at a point where the student is able to answer 50 percent of the items at that difficulty level in the continuum. The total length of the scale may never be shown for any one student, only that portion within the student's ability range. The Mastery Level Scale indicates the student's odds for success on any item in the scale. The Student Report was designed to present individual achievement in terms of a position on a continuum of skills within a content area as measured by the Rasch scaling procedure. When used in conjunction with the set of skills continua, it is possible to identify areas of instructional improvement.

C. Administrator's Summary

This form provides a summary of the frequencies of the Measures on Scale

achieved in a school, region, or system (Figure 4). By examining the graphic representation of scores, it is possible to obtain a picture of the group's performance.

D. Curriculum Match Report

This report presents for each grade level, by item, the calibrated difficulty value and the expected and observed percents correct (Figure 5). Two major indicators must be considered when analyzing this report form: (1) the percentage of students answering an item correctly, and (2) the degree of discrepancy between the expected and observed performance levels. A school or region must determine the standard for performance, e.g. 70 percent correct, and determine which skills fall below that standard. It must be decided also what constitutes a large discrepancy. For example, if ± 5 is used as the discrepancy level for identifying strengths and weaknesses and 70 percent is the performance criterion, than a curricular weakness is a skill that has a performance percentage below 70 percent and a discrepancy greater than -5 points between the expected and the observed. This report is most useful for identifying strong and weak areas in the curriculum.

E. Group Analysis Report

The group analysis form is a school level only report and provides for each student in a grade which items were answered correctly and incorrectly. It can be used for grouping students for instruction by skill area (Figure 6).

F. Skills Continua

There is a separate set of skills continua for each subject area tested. A continuum is a group of related skills arranged on the basis of their measured difficulties and presented graphically as bands of interrelated skills (Figure 7). The scale used on a continuum is the same achievement scale used in the Student Report Form. The skills continua have potential for use in relating the individual student or a total grade to the total curricular sequence.

IV. USE OF TEST RESULTS

Inservice training was provided in the six DoDDS regions to administrators, teachers, specialists, and parents on the interpretation and use of the test results. Use of the results, as reported by the trainers and in a Spring 1981 survey of teachers, principals, and reading improvement specialists, is summarized below.

Very few, approximately 10 percent or less, of the educators reported that they had made extensive use of the results. Some use of the results was reported by about one-third of the educators, especially for the purpose of identifying skill areas for classroom instructional emphasis. A greater proportion than desired, about 40-50 percent, of the teachers reported no use of the results for any of the specified purposes.

It was found that a substantial number of educators were not using the test results from the Rasch-based testing program. As one of the main reasons for adopting this latent trait methodology was to increase test results utility, this issue is of major concern. What are some of the reasons for lack of test results use?

First, it appears that the inservice training delivered was not adequate for the program. A new testing program using innovative measurement methods implemented in a school system with 280 schools in 20 countries requires extensive inservice training. Lack of adequate travel funds and prepared inservice materials impeded the implementation of an adequate program of information.

Secondly, due to the problems of mailing answer sheets and processed results between overseas areas and the United States, the time between testing and receipt of results, about 4 months, precluded immediate use of results. In addition, for the first 2 years of the program, the testing took place in the spring. By the time the results were received in the schools in the fall of the next school year, approximately one-third of the students were no longer in the school. Those students returning were in different classrooms. These factors do not facilitate test use.

Thirdly, Fall 1981, was the first time that the Parent Report Form was introduced. This simplified format containing individual student results happened to be more useful to teachers than the other reporting formats (i.e. Student Report Form, Sets of Continua).

Fourthly, in the course of developing a new testing program, errors are made. Some errors did appear on reporting forms returned to teachers. This factor caused educators to doubt the entire program.

Finally, one of the key advantages of using Rasch, which is relating an individual student to the entire calibrated curriculum through the continua sets, proved to be quite difficult. This was due to the complexity of the formats and the "immature" sets of skills continua. The combination of relatively complex reporting forms, inadequate inservice information in some areas, untimely receipt of results, and errors in reporting, contributed to nonuse of results.

IV. RECOMMENDATIONS

It has been both exciting and challenging to be involved in developing and implementing a basic skills assessment program using the innovative measurement methodology of latent trait theory. However, the experiences of 3 years have magnified the importance of several concepts relevant to this type of testing program: training, timeliness, simplicity, and trust. These concepts are reflected in the following general recommendations for improving the testing program.

A. Simplify the reporting formats for teachers, especially the Student Report

Form and its relationship to the sets of curriculum continua.

B. Improve the inservice training for educators expected to use the results. There appears to be a tendency among educators to mistrust change. Educators must be assisted in understanding and trusting the new approach through training which incorporates practice in using the results.

C. The time between testing and receipt of results in the schools must be shortened. Timeliness is of the essence.

D. Incorporate in the test approximately four items per objective, instead of one, in order to provide difficulty levels and expected and observed percents correct for objectives.

E. Include yearly tests which have been equated.

F. The most precise measurement occurs when students answer items which closely match their abilities. As the basic skills tests were found to be most accurate for students in the middle ability levels and score ranges, appropriate tests are needed for compensatory education and gifted students if a major use of the tests is to be for individual diagnosis.

G. The major purposes of a testing program must be examined. What is the best way to satisfy both purposes of program evaluation and individual diagnosis of strengths and weaknesses?

H. More precise test specifications concerning such areas as range of test difficulty should be provided in advance of test construction.

I. Scores from a national comparison group were provided for the Fall 1981 testing. In addition to the given percentile equivalent scores, national expected percent correct scores should be furnished.

Table 1.

Number of Items, Skills Assessed and Average Form Difficulty of the Basic Skills Assessment Tests

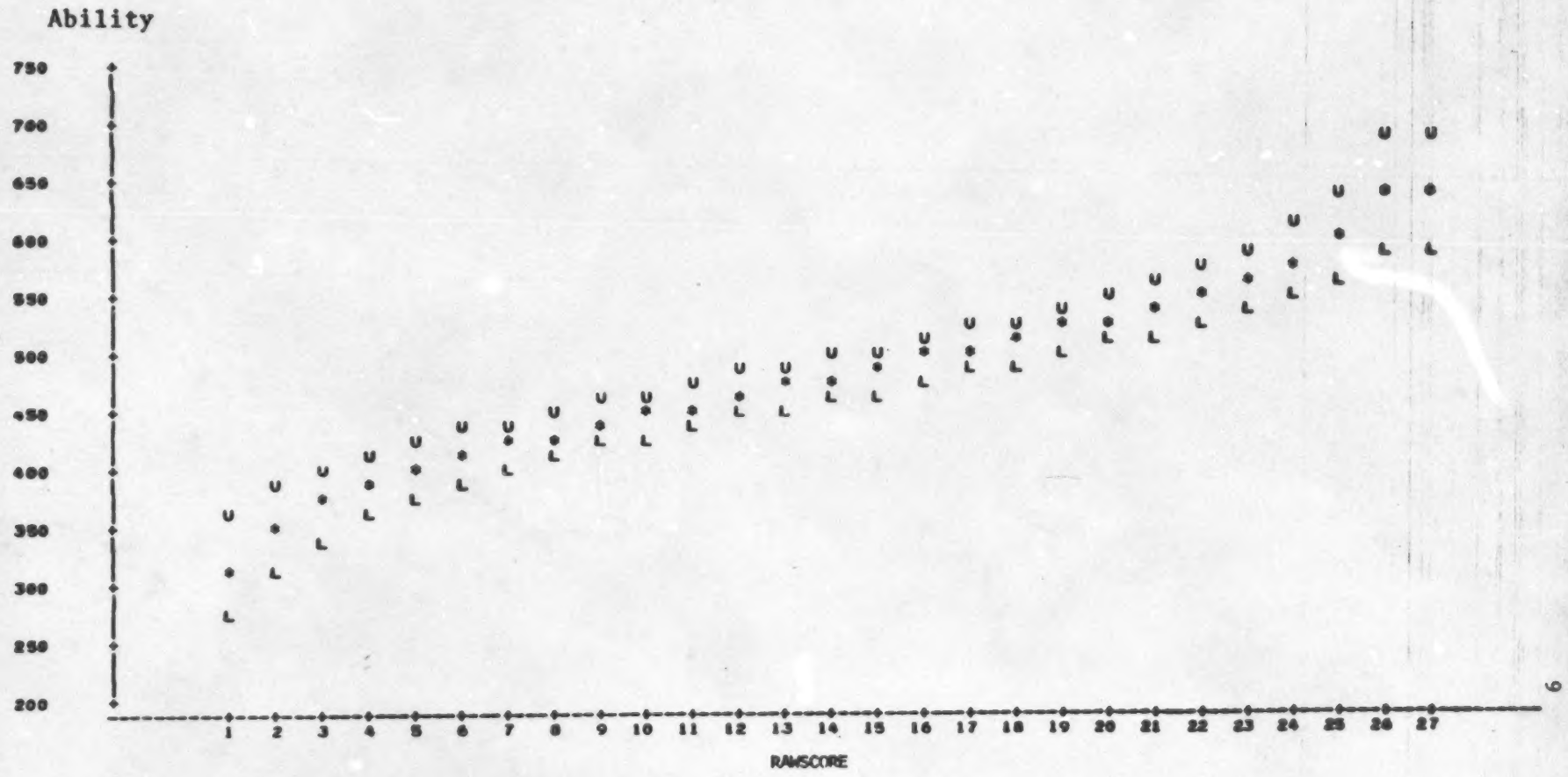
Name of Test	Grade Level	Total Number of Items	Number of Items Per Skill		Average Rasch Difficulty of Form and Difficulty Range
READING	4	27	Phonetic Analysis	4	492
			Structural Analysis	3	(395-557)
			Word Recognition/Meaning	7	
			Literal Comprehension	4	
			Interpretive Comprehension	4	
			Evaluative Comprehension	2	
			Reference Skills	3	
	6	31	Structural Analysis	3	516
			Word Recognition/Meaning	6	(451-581)
			Literal Comprehension	2	
			Interpretive Comprehension	5	
			Evaluative Comprehension	4	
			Reference/Study Skills	11	
	7	30	Structural Analysis	6	527
			Word Meaning/Recognition	3	(456-615)
			Literal Comprehension	2	
			Interpretive Comprehension	9	
			Evaluative Comprehension	4	
			Reference/Study Skills	6	
	9	32	Structural Analysis	3	565
			Word Meaning/Recognition	5	(477-640)
			Interpretive Comprehension	8	
			Evaluative Comprehension	3	
			Reference/Study Skills	13	
	11	29	Structural Analysis	1	568
			Word Recognition/Meaning	3	(488-665)
			Interpretive Comprehension	10	
			Evaluative Comprehension	8	
			Reference/Study Skills	7	

Table 2.

Quality of Measure Indices - Mean and Range for 1981 Basic Skills Assessment Tests

	Grade											
	4		6		7		8		9		11	
Subject	X	Range	X	Range	X	Range	X	Range	X	Range	X	Range
Reading	95.0	69-100	98.0	86-100	97.7	73-100			97.6	70-100	97.6	76-100
Language Arts	96.2	58-100	97.0	49-100			96.4	70-100	96.1	48-100	96.8	64-100
Mathematics	97.0	59-100	97.1	65-100			96.6	47-100	96.9	49-100		

Figure 1. **Precision of Measurement for Rasch Ability Scores**
Reading, Grade 4



U = 1 standard error above

L = 1 standard error below

Figure 2. Parent Report Form

DEPARTMENT OF DEFENSE DEPENDENTS SCHOOLS

Basic Skills Assessment Program

MATHEMATICS

Test Date 9/81
Form 0706
Sch 2-2630
No. 005

PARENT REPORT FOR:

Student Name		Grade	6	Sex	M
School Name	BITBURG MIDDLE	Birthdate	2/24/70		

This is a report of your child's performance on a basic skills test in MATHEMATICS administered to all pupils in grade 6 during the early fall, 1981. While this report will help keep you informed of your child's progress, please remember that test scores are only one measure of achievement in school. Your child's teacher is the best single source of information concerning your child's progress in our schools. Please contact the school if you wish additional information.

The reverse side of this report explains the terms used below.

Measure on Scale	549
Percentile Rank	92
Grade Level Range	311-642

*This Percentile Rank is based on Spring, 1981 national norms.

Based on your child's ability measure (Measure on Scale), the following relative strengths or weaknesses have been identified.

SKILL AREA STRENGTHS:
- Compute factors of a number
- Compute greatest common factor
- Apply properties of order and sequence
- Multiply 3-digit integers with regrouping
- Multiply 3-digit by 2-digit integers without regrouping
- Multiply 3-digit by 2-digit integers with regrouping
- Compute averages
- Add multidigit integers with regrouping
- Divide mixed decimals by whole numbers
- Divide decimals by whole numbers
- Convert improper fractions to mixed numbers
- Solve problems - Division without remainder
- Solve problems - Addition and subtraction
- Subtract mixed decimals with points aligned
- Multiply whole numbers by 1-place decimals
- Divide 3-digit by 2-digit integers - no remainder
- Divide 5-digit by 2-digit integers - no remainder
- Multiply 1-digit by 1-digit by 1-digit integers
- Identify 2-dimensional geometric figures
- Measure metric perimeters
- Combine mixed decimals

SKILL AREAS WHICH MAY NEED ADDITIONAL INSTRUCTION:
- Solve problems - area

SKILL AREAS NOT YET MASTERED:
- Comprehend magnitude of numbers
- Convert mixed numbers to improper fractions
- Read and analyze graphs and charts
- Demonstrate computer literacy

Figure 3. Student Report Form

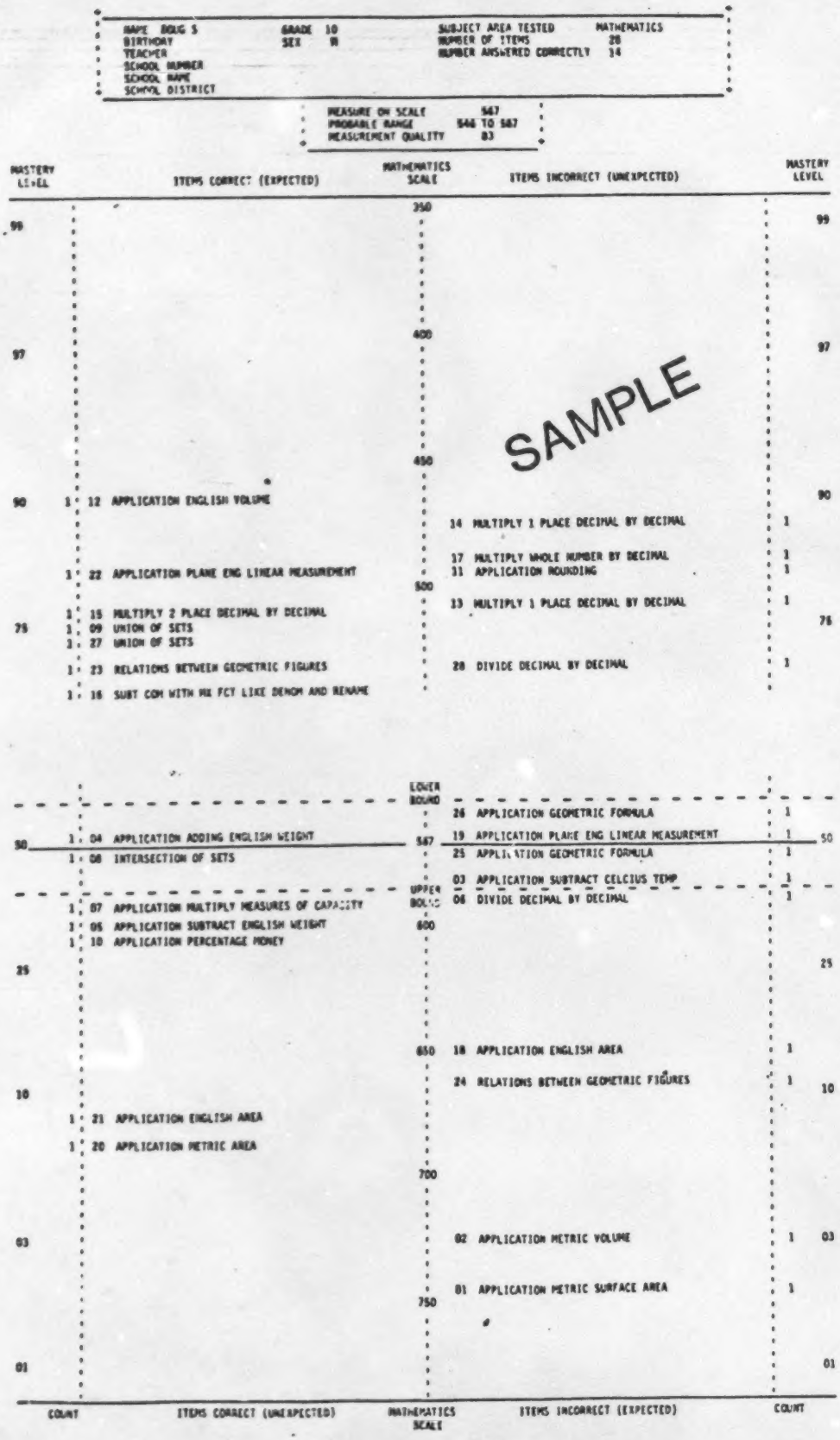


Figure 4. Administrator's Summary Report

WORLD REPORT | READING COMP | 704 | 11122 | FALL '81 | 8-0463 | 1 | 004-1837

BASIC SKILLS ASSESSMENT
ADMINISTRATOR'S SUMMARY

GRADE 4

THIS GROUP:
MEAN 537.38
STANDARD DEVIATION 60.20

FIRST QUARTILE 494.08
MEDIAN 536.86
THIRD QUARTILE 580.02

Measure on scale	Frequency	Percentage	Cumulative Frequency	Cumulative Percentage	Local Percentile
316	3	.02	3	.02	01
350	17	.15	20	.17	01
371	18	.16	38	.34	01
387	24	.21	62	.55	01
400	47	.42	109	.98	01
411	99	.89	208	1.87	01
421	133	1.19	341	3.06	02
430	182	1.63	523	4.70	04
439	178	1.60	701	6.30	06
447	249	2.23	950	8.54	07
455	231	2.07	1,181	10.61	10
463	301	2.70	1,482	13.32	12
471	294	2.64	1,776	15.96	15
479	335	3.01	2,111	18.98	17
486	396	3.56	2,507	22.54	21
494	471	4.23	2,978	26.77	25
502	494	4.44	3,472	31.21	29
511	509	4.57	3,981	35.79	34
520	625	5.61	4,606	41.41	39
529	666	5.98	5,272	47.40	44
539	794	7.13	6,066	54.54	51
551	907	8.15	6,973	62.69	59
564	874	7.85	7,847	70.55	67
580	948	8.52	8,795	79.07	75
601	932	8.37	9,727	87.45	83
635	1395	12.54	11,122	100.00	94

Figure 5. Curriculum Match Report

WORLD REPORT READING COMP. 704 11,123 FALL '81 6-0463 1 004-1855

DEPARTMENT OF DEFENSE DEPENDENTS SCHOOLS

BASIC SKILLS ASSESSMENT
CURRICULUM MATCH

GRADE 04

Item No.	Skill Area/Item Descriptor	Calibrated Difficulty Value	Expected Percent Correct	Observed Percent Correct	Percent Discrepancy
	PHONETIC ANALYSIS-VOWELS				
02	RECOGNIZE SHORT VOWEL SOUNDS	486	69	68	- 1
01	RECOGNIZE LONG VOWEL SOUNDS	524	55	61	+ 6
	PHONETIC ANALYSIS-CONSONANTS				
04	RECOGNIZE VARIANT CONSONANT SOUNDS	402	91	90	- 1
03	RECOGNIZE INITIAL CONSONANT BLENDS	496	66	76	+ 10
	DICTIONARY				
06	ALPHABETIZE BY SECOND LETTER	476	73	65	- 8
05	ALPHABETIZE BY FIRST LETTER	454	80	79	- 1
	STRUCTURAL ANALYSIS-INDIVIDUAL WORD				
07	IDENTIFY ROOT WORDS	405	90	86	- 4
09	IDENTIFY ROOT WORDS	539	49	68	+ 19
	WORD MEANING				
23	IDENTIFY SYNONYMS	445	82	54	- 28
27	USE CONTEXTUAL CLUES	462	77	66	- 11
08	IDENTIFY SYNONYMS	395	91	84	- 7
10	IDENTIFY ANTONYMS	459	78	75	- 3
26	USE CONTEXTUAL CLUES	487	69	79	+ 10
	WORD RECOGNITION				
12	IDENTIFY IRREGULAR PLURALS	459	78	68	- 10
11	IDENTIFY IRREGULAR PLURALS	556	42	81	+ 39
	LITERAL COMPREHENSION				
19	RECOGNIZE THE SEQUENCE OF STORY EVENTS	482	71	53	- 18
15	RECOGNIZE THE MAIN IDEA (L)	474	74	59	- 15
21	FOLLOW DIRECTIONS	518	58	62	+ 4
17	IDENTIFY DETAILS	557	42	80	+ 38
	EVALUATIVE COMPREHENSION				
29	RECOGNIZE MAIN IDEA (E)	492	67	53	- 14
14	DISTINGUISH FACT FROM FANCY	459	78	84	+ 6
	INTERPRETIVE COMPREHENSION				
16	IDENTIFY OUTCOMES	458	78	76	- 2
20	IDENTIFY CHARACTER TRAITS	444	82	80	- 2
24	RECOGNIZE MAIN IDEA (I)	500	64	70	+ 6
18	RECOGNIZE CAUSE AND EFFECT	501	64	78	+ 14
	STUDY SKILLS - USE OF REFERENCE MATERIALS				
22	USE TABLE OF CONTENTS	434	84	83	- 1
	MULTIPLE WORD FORMS				
25	RECOGNIZE COMPOUND WORDS	429	86	80	- 6

Curriculum Match Profile - X = Expected; O = Observed

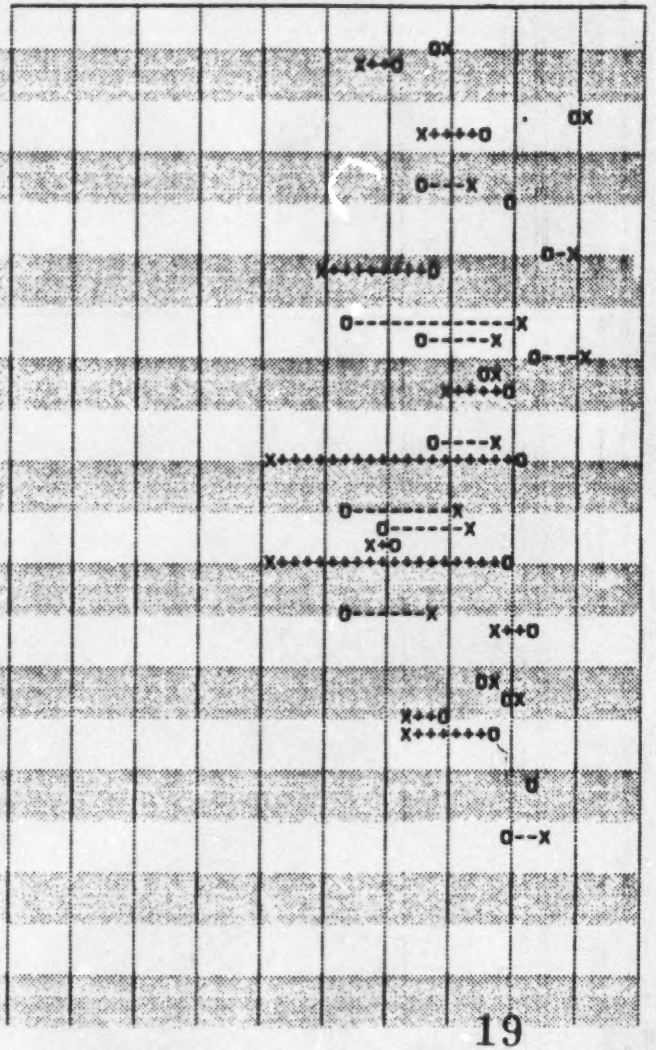


Figure 6. Group Analysis Report

READING 303 0145 MAY-80 3-3465 3 008-0016

DEPARTMENT OF DEFENSE

BASIC SKILLS ASSESSMENT
GROUP ANALYSIS
GRADE 3

KEY

\+ = EXPECTED CORRECT ! = UNEXPECTED CORRECT

\- = EXPECTED INCORRECT ? = UNEXPECTED INCORRECT

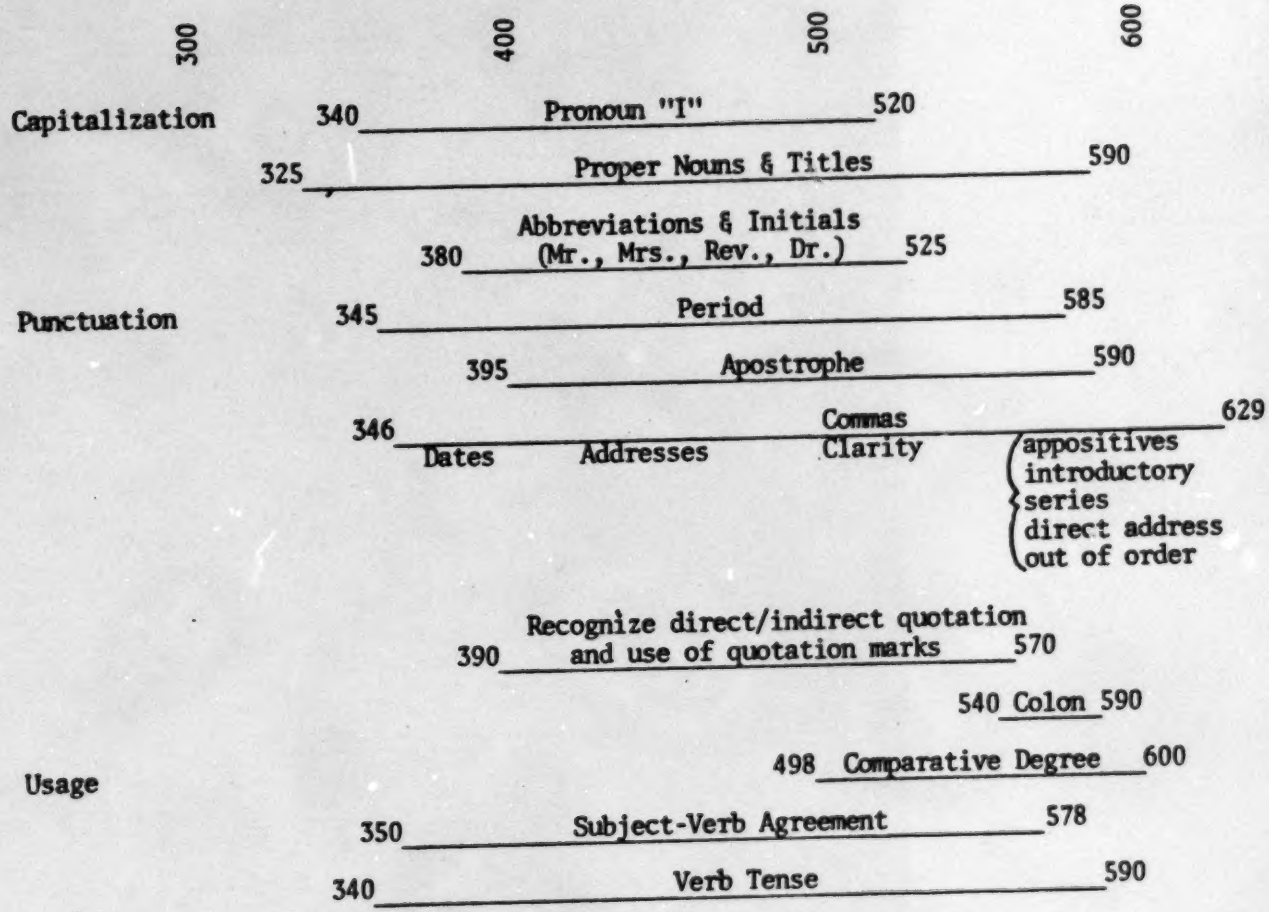
ITEM NO.	SKILL AREA/ITEM DESCRIPTOR	FARRIS EDWARD R	FISHER STEVEN	GENSLER MARK E	GRIMALDI ARON	HEINRICH WALLY	LAPOLLO PATRIC	LARYEA WARREN	MARKLE EDWARD	MEANS CHRIST	OSICZANEK ST	SALISBURY THOM	SIEVENSER WESL	SWANDEBORAH L	WHALEY KIMBERL	WILLIAMSON KIM	WOODM JEFFREY	WOUTERS DANNY	BAYSIAC,	BEGLEMACHEW	BEUERMANR LIS	BINKERD THOMAS	BOYD MANUELA M	BUKOSKI FRANCI	CARROLL ALICE	CLARK DAVID G	COMSTOCK ANGEL	DOTY JAMES B	FLORES M VANES	FLORREICH KJU	FRANK R NICOLE	GICK C WARNIE	HARVEY DONALD	HUBBARD CHRIST	JOHNSON ERIC J	JOYNER LAURA B	KESLER LAURA L	KLAPUT SONYA L	LETSON AIMEE J	MALONE J MARIO	MCCRARY PATRIC	MCLELLAN B RON	NEELY MARCIA L	NEWTON LISA A	OLIVO CHRISTOP	ORTIZ EARL T
	PHONETIC ANALYSIS-CONSONANTS																																												
01	SINGLE INITIAL CONSONANTS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
02	SINGLE INITIAL CONSONANTS	!	+	!	+	+	+	+	+	+	!	!	!	!	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
03	SINGLE INITIAL CONSONANTS	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
04	VARIANT CONSONANTAL SOUNDS	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	PHONETIC ANALYSIS-VOWELS																																												
18	SHORT VOWEL SOUNDS	+	+	!	+	+	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+	!	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
16	SHORT VOWEL SOUNDS	?	!	?	!	+	+	!	+	+	+	+	!	?	+	+	+	+	!	+	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+	+	!	+	+	+	?	+	+	+	+	+
17	LONG VOWEL SOUNDS	+	+	-	?	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	STRUCTURAL ANALYSIS-INDIVIDUAL WORD FORMS																																												
13	SUFFIXES	+	+	?	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
07	PLURAL NOUNS-INFLECTIONAL ENDINGS	?	?	+	?	+	+	+	?	+	?	?	+	+	+	+	?	?	+	+	+	+	+	+	?	+	+	?	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+	+	+	+
12	ROOT WORDS	!	+	!	+	+	+	?	+	!	?	+	!	+	+	?	+	+	+	+	+	+	+	+	+	+	+	?	+	!	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+
	MULTIPLE WORD FORMS																																												
11	COMPOUND WORDS	+	?	+	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	WORD RECOGNITION																																												
06	WORD RECOGNITION-BASIC SIGHT WORDS	+	+	+	!	+	+	+	+	+	+	+	+	+	+	+	+	+	+	!	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
15	WORD RECOGNITION-BASIC SIGHT WORDS	!	+	-	!	+	+	+	?	+	!	!	?	+	+	+	+	+	+	!	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	WORD MEANING																																												
22	WORD MEANING-CONTEXTUAL MEANING	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	!	!	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
08	WORD MEANING-CONTEXTUAL MEANING	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	!	.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	LITERAL COMPREHENSION																																												
25	LITERAL COMPREHENSION-DETAILS	+	+	!	+	+	+	!	+	?	+	+	?	+	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+	+
20	LITERAL COMPREHENSION-DETAILS	+	+	-	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+	+
26	LITERAL COMPREHENSION-DETAILS	!	+	!	!	+	+	!	!	+	+	!	+	?	!	!	!	!	+	+	+	+	+	+	?	+	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+	+
09	LITERAL COMPREHENSION-SEQUENCE	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
14	LITERAL COMPREHENSION-MAIN IDEA	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	INTERPRETIVE COMPREHENSION																																												
19	INTERPRETIVE COMPREHENSION-MAIN IDEA	+	+	+	+	+	+	+	+	+	+	+	+	!	?	?	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
21	INTER COMP - CAUSE AND EFFECT	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
10	INTERPRETIVE COMP.-IDENTIFYING OUTCOMES	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	EVALUATIVE COMPREHENSION																																												
05	EVAL COMP - DISTINGUISH FANTASY AND REALISM	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	DICTIONARY																																												
23	ALPHABETIZING	+	+	+	+	+	?	+	+	?	+	?	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	?	+	+
24	TABLE OF CONTENTS USE	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
	STUDENT SCORE	6 0 2	6 0 2	6 0 2	6 0 2	6 0 2	6 0 2	6 0 2	6 0 2	6 0 2	6 0 2	6 0 2	3 0 2	6 0 2	6 0 2	6 0 2	6 0 2	6 0 2	6 0 2	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7	6 3 7
	MEASUREMENT QUALITY	0 9 9	0 9 8	0 9 9	0 9 5	0 9 5	0 9 8	0 9 7	0 9 8	0 9 9	0 9 8	0 9 7	0 7 8	0 9 9	0 9 9	0 9 8	0 9 6	0 9 8	0 8 3	0 8 9	0 8 9	0 8 3	0 8 3	0 9 6	0 9 8	0 9 7	0 9 4	0 9 8	0 9 3	0 8 3	0 9 8	0 9 9	0 8 3	0 9 8	0 9 6	0 9 5	0 9 7	0 9 4	0 8 3	0 9 9	0 9 7	0 9 5	0 9 4	0 9 5	0 9 8	0 9 9	0 8 3	0 8 3

14

20

21

Figure 7. Language Arts Skills Continuum



REFERENCES

Hambleton, R. Putting Latent Trait Models into Perspective: Their Advantages and Disadvantages for District and State Assessment Application. Invited paper presented at 10th Annual Conference on Large-Scale Assessment, Boulder, Colorado, 1980.

Los Angeles County Test Development Center. Basic Skills Assessment Program Technical Report, 1981.

Los Angeles County Test Development Center. Basic Skills Assessment Program Technical Report, 1982.